Rhodeus haradai, a New Bitterling from Hainan Island, China, with Notes on the Synonymy of Rhodeus spinalis (Pisces, Cyprinidae)

by

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Abstract   A new bitterling, *Rhodeus haradai*, is described on the basis of 13 specimens from Hainan Island, southern China.   The new species is characteristic in a narrow longitudinal band of the male body side and the protruding muscular breast region. *Pseudoperilampus hainanensis* NICHOLS et POPE, 1927, is synonymized with *Rhodeus spinalis* OSHIMA, 1926, and the neotype is designated for *R. spinalis*.

Four bitterlings having the incomplete lateral line have been reported from Hainan Island, southern China, i. e., *Rhodeus ocellatus*, *R. spinalis*, *R. lighti* (=*Pseudoperilampus lighti*), and *R. hainanensis* (=*Pseudoperilampus hainanensis*) (OSHIMA, 1926; NICHOLS & POPE, 1927; JIN, 1986).   Among them *R. spinalis* and *R. hainanensis* have been considered to be endemic to Hainan Island, although *R. spinalis* was recently reported from the Pearl River System (LIN, 1989).   However, *R. spinalis* is so much similar to *R. hainanensis* that the differentiation of these two species is very difficult.   Except the original description of *R. hainanensis* (NICHOLS & POPE, 1927), specimens of both *R. spinalis* and *R. hainanensis* were examined only by JIN (1986).

On the other hand, we had the chance at the National Taiwan University to observe the *Rhodeus* specimens from Hainan Island, which were identified as *R. spinalis* by HARADA (1943), and it was found that they are different from *R. spinalis* and *R. hainanensis*.   Therefore, we examined the specimens of *R. spinalis* and *R. hainanensis* from the American Museum of Natural History, and the specimens of *R. spinalis* sensu HARADA to clarify their interrelationships.

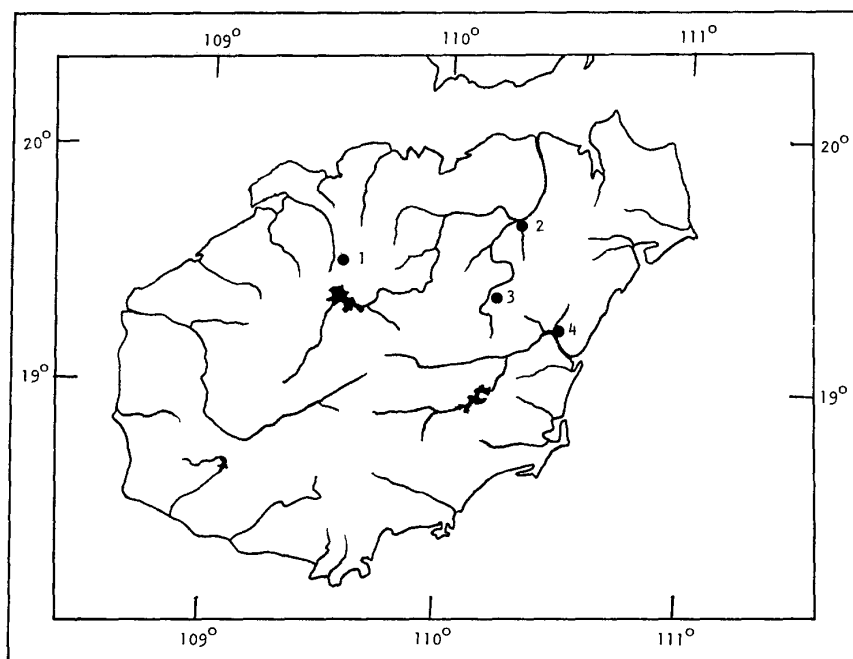142   Ryoichi Arai, Nobuhiro Suzuki and Shih Chieh Shen

Fig. 1. A map showing localities of materials examined and type localities of *Rhodeus* species. 1. Nodoa=Nada, locality of holotype of *R. hainanensis*; 2. Ding'an, locality of neotype of *R. spinalis*; 3. Longtang, locality of holotype of *R. haradai* sp. nov.; 4. Kachek, locality of syntypes of *R. spinalis*.

Materials and Method

Specimens examined are shown in the description of each species. As regards catalogue numbers, abbreviations of institutes are as follows: AMNH, American Museum of Natural History; NSMT, National Science Museum, Tokyo; NTUM, National Taiwan University.

Figure 1 shows collection localities of specimens examined. Counts and measurements follow Hubbs and Lagler (1947). Vertebrae and unpaired fin rays were counted from radiographs. Positions of the pterygiophores of the first dorsal fin ray (D-PTG-1) and the first anal fin ray (A-PTG-1) were examined from radiographs. When the nth pterygiophore of the dorsal fin ray (D-PTG-n) is inserted between neural spines of the mth and (m+1) th vertebral centra, the position of D-PTG-n is expressed as D-PTG-n=m. When the nth pterygiophore of the anal fin ray (A-PTG-n) is inserted between haemal spines of the mth and (m+1) th vertebral centra, or in front of the (m+1) th vertebral centrum where the pterygiophore is placed in front of the first haemal spine, the position of A-PTG-n is expressed as A-PTG-n=m.

The pharyngeal teeth and gill rakers were examined with a Nihon Denshi JSM-T 330A scanning electron microscope (SEM). Method of the preparation for SEM observation follows Suzuki and Hibiya (1985). Terminology of the pharyngeal teeth is adopted from Kodera (1982).
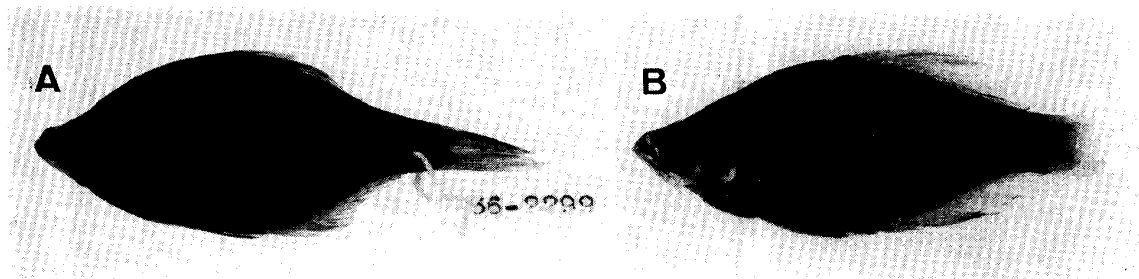
Fig. 2. *Rhodeus spinalis*. A: Neotype of *Rhodeus spinalis*, NSMT-P 31906, 49.7 mm SL, male, from Ding'an, Hainan Island (previous cat. no. 66-2299, from Prof. Wu Hanling). B: Holotype of *R. hainanensis*, AMNH 8386, 39.0 mm SL, from Nada, Hainan Island.

Two specimens in each of *Rhodeus spinalis*, *R. hainanensis* and *R. haradai* sp. nov. were used for observation of the pharyngeal teeth and gill rakers.

Classification of the genera of the subfamily Acheilognathinae follows ARAI and AKAI (1988).

Rhodeus spinalis OSHIMA, 1926

[New Japanese name: Toge-bara-tanago]

(Figs. 2–3)

Rhodeus spinalis OSHIMA, 1926, p. 16; JIN, 1986, p. 62 (in part); ZHU, 1988, unnumbered fig.; LIN, 1989, p. 158, fig. 120.
Pseudoperilampus hainanensis NICHOLS and POPE, 1927, p. 379, fig. 42; WU, 1964, p. 205, fig. 5-5; JIN, 1986, p. 65. fig. 36.

Neotype. NSMT-P 31906, male, 49.7 mm in standard length (SL), Ding'an, Hainan Island on March 27, 1966. The neotype is designated by the following reasons.

1) All type specimens of *R. spinalis* were lost: In the original description of *R. spinalis* no catalogue number and no type depository are given. The syntypes were expected to be found in Japan because the author of *R. spinalis* is a Japanese and the original description was published in a Japanese journal. As the results, we could not find them in any Japanese institute and museum where they may be kept. We asked old Japanese ichthyologists about the syntypes, but they did not know. Parts of fish specimens collected by Dr. OSHIMA are kept at the Saito Ho-on Kwai Museum, Sendai, and Dr. ABE's collection, but the syntypes are not found in either collection. As regards OSHIMA's collection at the Tokyo Metropolitan University where Dr. OSHIMA was a professor, Mr. Kazuhiro OONISI of the University informed us that the OSHIMA's collection had already been lost in 1960 when the Faculty of Science of the University was transferred.

Outside Japan, we checked the catalogues of type specimens in museums in USA where a part of type specimens erected by Dr. OSHIMA is kept, e. g., Academy of Natural Sciences of Philadelphia, Field Museum of Natural History, and National Museum of Natural History, but we could not find the syntypes. We also confirmed

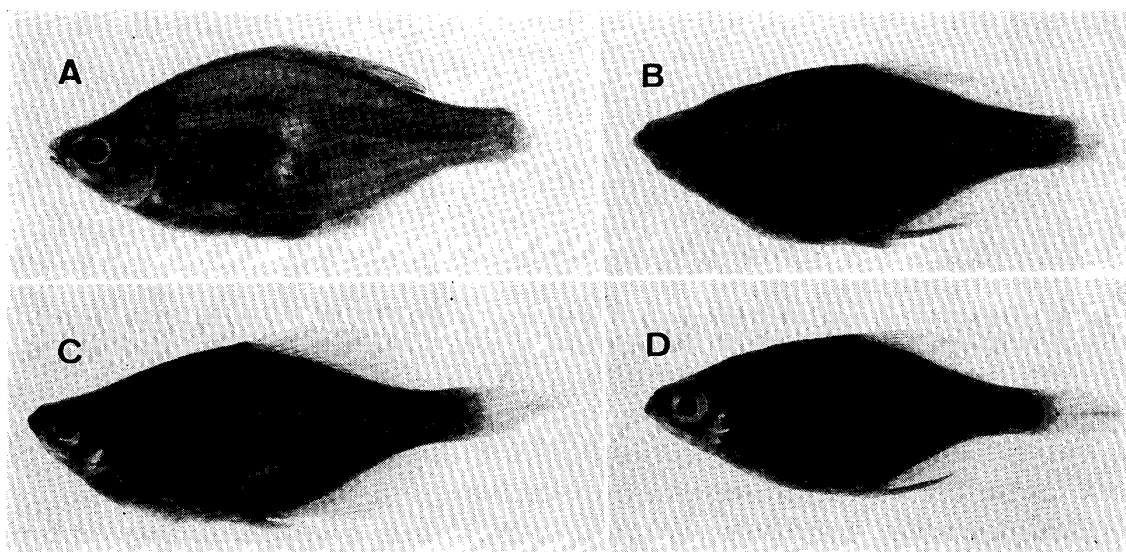144   Ryoichi Arai, Nobuhiro Suzuki and Shih Chieh Shen

Fig. 3.   *Rhodeus spinalis* from Nada, Hainan Island.   A: Male of *R. spinalis*, AMNH 29675, 54.0 mm SL. B: Female of *R. spinalis*, AMNH 29680, 33.4 mm SL. C: Male of *R. hainanensis*, NSMT-P 32696, 37.4 mm SL. D: Female of *R. hainanensis*, NSMT-P 32696, 32.0 mm SL. Specimens of NSMT-P 32696 were previously a part of AMNH 10769.
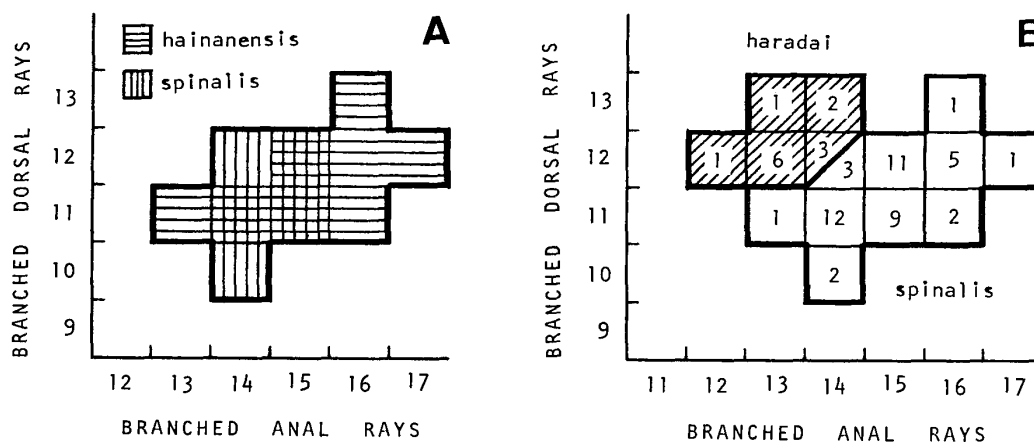

Fig. 4.   Combinations of the numbers of branched dorsal fin rays and branched anal fin rays in *Rhodeus spinalis* and *R. haradai* sp. nov.   A: *R. spinalis* and *R. hainanensis*. As for details, see Tables 1 and 2. B: *R. spinalis* (= *R. spinalis* and *R. hainanensis*) and *R. haradai* sp. nov. Numeral in each square indicates number of individuals.

the absence of the syntypes at American Museum of Natural History and California Academy of Sciences (pers. comm. by M. Norma Feinberg, 1989; pers. comm. by David Catania, 1990).   2) Characteristics of the neotype agree well with the original description of *R. spinalis*.

Diagnosis.   This species is different from all other *Rhodeus* species in numerous anal fin rays, i. e., the value of the number of branched anal rays minus that of branched dorsal rays ranges 2 to 5, 3 in mode (Fig. 4), and the longest simple rays of the
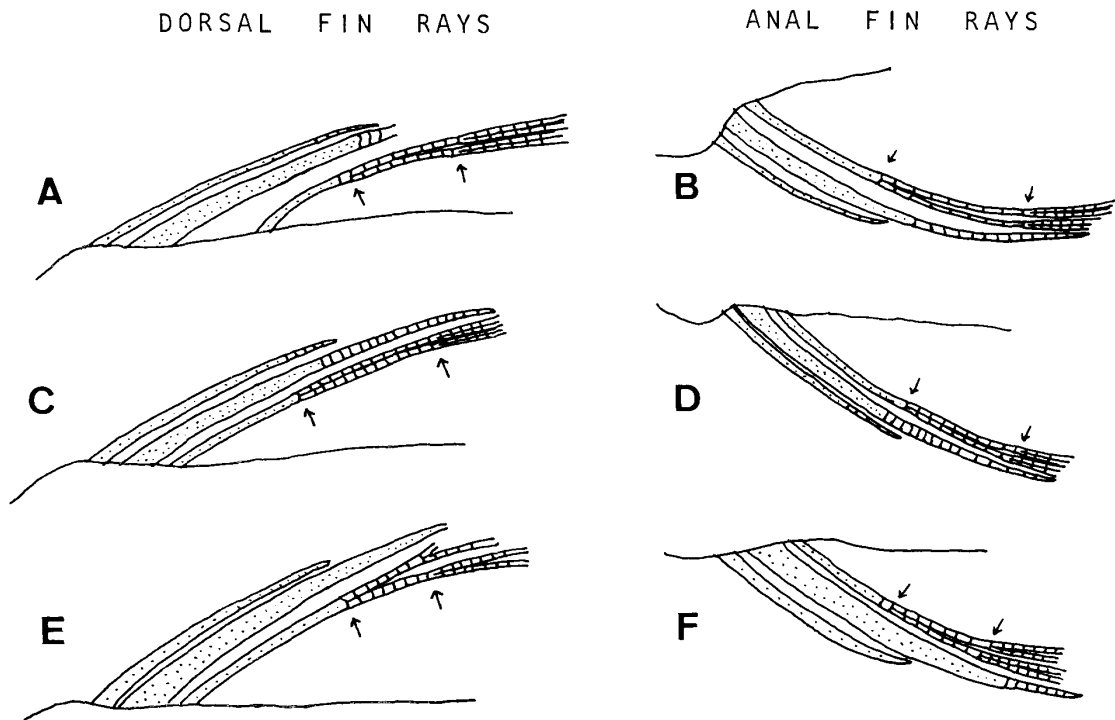
DORSAL FIN RAYS   ANAL FIN RAYS

Fig. 5. Longest simple rays of dorsal and anal fins. A: *Rhodeus spinalis*, neotype, NSMT-P 31906, 49.7 mm SL, male. B: *R. spinalis*, AMNH 29678, 35.2 mm SL, female. C and D: *R. hainanensis*, AMNH 10795, 48.0 mm SL, male. E: *R. haradai* sp. nov., holotype, NTUM 7600, 56.0 mm SL, male. F: *R. haradai* sp. nov., NSMT-P. 30930, 55.0 mm SL, male. Arrows indicate branching points of fin rays. The first simple rays of the dorsal and anal fins are very small and hidden under the scales.

dorsal and anal fins are strong and spiny.

Material examined. NSMT-P 31906 (neotype of *R. spinalis*), male, Ding'an, Hainan Island; NSMT-P 31907, female, Ding'an, Hainan Island, March 27, 1966; AMNH 29675, 1 individual, Nodoa (=Nada), Hainan Island, Nov. 1922 to Aug. 1923; AMNH 29678, 1, and AMNH 29680, 5, Nada, Hainan Island, Nov. 1922 to Aug. 1923; AMNH 8386 (holotype of *Pseudoperilampus hainanensis*), male, Nada, Hainan Island, Feb. 27, 1923; AMNH 10769, 20, NSMT-P 32696 (previously a part of AMNH 10769), 5, and AMNH 10795, 6, Nada, Hainan Island, Nov. 1922 to Aug. 1923; NTUM 410, 3, Hainan Island.

Description. Morphometric and meristic data (Tables 1 and 2). Data of neotype are shown in parentheses. Total length 122.5–134.0 (134.0) %SL; head length 22.0–28.4 (26.4) %SL; body depth 40.0–52.7 (52.7) %SL, increasing with growth; predorsal length 52.2–60.6 (60.6) %SL; length of caudal peduncle 14.1–22.4 (18.5) %SL; depth of caudal peduncle 11.4–14.9 (14.5) %SL; orbit diameter 7.7–11.2 (8.5) %SL, decreasing with growth; snout length 4.9–7.4 (6.8) %SL.

Dorsal fin rays iii, 10–13 (iii, 11); Anal fin rays iii, 13–17 (iii, 15); branched anal rays minus branched dorsal rays, 2–5 (4); pectoral fin rays i, 10–13 (i, 11); pelvic fin

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Table 1. Meristic counts and morphometric measurements of *Rhodeus spinalis*.

Specimens	Sex	TL (mm)	SL (mm)	HL (%SL)	BD (%SL)	OD (%SL)	Scales		Branched rays		P₁	P₂	VN*	D-PTG	A-PTG
							LS*	PS*	D	A					
Neotype															
NSMT-P 31906	M	66.0	49.7	26.4	52.7	8.5	33+2	11	11	15	i, 11	i, 7	34	10	16
Nontypes															
AMNH 29675	M	?	54.0	23.1	43.5	8.3	34+2	7	12	15	i, 13	i, 7	34	10	16
NSMT-P 31907	F	?	40.8	24.0	47.5	9.1	32+2	7	12	14	i, 12	i, 7	33	10	16
AMNH 29678	F	?	35.2	24.7	42.6	9.9	33+2	5	11	15	i, 12	i, 7	34	10	16
AMNH 29680	M	?	36.4	26.4	40.4	9.9	33+2	8	12	15	i, 12	i, 7	34	10	16
	F	?	36.6	25.1	43.7	10.1	32+?	9	12	15	i, 11	i, 7	33	9	16
	F	?	35.8	25.6	41.9	9.8	33+2	6	12	15	i, 11	i, 7	34	10	16
	F	?	33.4	27.3	44.5	10.9	33+2	8	12	14	i, 11	i, 7	34	10	16
	F	?	31.8	26.7	44.3	11.0	33+2	8	12	15	?	i, 7	34	11	16
Syntypes**		78.0		24.2	50.0	8.1	34		10	14	13	8			
							34		10	14	13	8			
							32		11	14	13	8			
							33		12	14	13	8			
							32		11	15	13	8			

* LS, scales in lateral series; PS, pored scales; VN, number of vertebrae.

** Data of syntypes which have been lost are cited from the original description of *R. spinalis* (Oshima, 1926). As regards the numbers of the pectoral and pelvic fin rays, unbranched rays and branched rays were not separated.

Table 2. Meristic counts and morphometric measurements of *Rhodeus hainanensis*.

Specimens	Sex	TL (mm)	SL (mm)	HL (%SL)	BD (%SL)	OD (%SL)	Scales		Branched rays		P₁	P₂	VN	D-PTG	A-PTG
							LS	PS	D	A				1	1
Holotype AMNH 8386	M	?	39.0*	25.6*	43.5*	10.3*	34*	5*	12	16			34.	10	16
Nontypes NTUM 410	M	70.2	57.3	22.0	47.1	7.7	33+2	8	12	15	i,12	i,7	34	10	16
	M	68.4	55.0	22.7	48.9	8.0	33+2	7	12	15	i,12	i,7	34	10	16
	M	62.5	49.1	24.4	50.5	9.2	33+2	7	12	15	i,13	i,7	34	10	17
AMNH 10769	M	?	39.0	24.6	42.8	9.5	34+2	6	12	16	i,11	i,7	34	10	16
	M	?	38.8	23.7	41.0	9.8	34+1	5	12	15	i,12	i,7	34	10	16
	F	?	37.7	24.7	42.4	9.8	34+1	7	12	16	i,12	i,7	34	10	16
	M	?	37.4	25.1	43.6	9.6	33+2	5	12	15	i,12	i,7	33	10	16
	F	?	36.4	26.1	43.1	9.6	33+1	5	11	15	i,12	i,7	34	10	15
	F	?	36.4	26.1	41.8	9.6	33+2	7	12	15	i,12	i,7	34	10	16
	M	?	36.3	26.7	41.0	9.9	33+1	7	11	16	i,12	i,7	34	10	16
	M	?	36.1	25.5	41.3	9.4	33+2	7	11	15	i,11	i,6	34	10	16
	M	?	36.0	25.6	43.1	9.7	33+2	5	11	15	i,11	i,7	34	10	16
	M	?	35.9	25.6	43.7	10.0	34+2	7	12	15	i,11	i,7	35	10	16
	M	?	35.9	24.5	45.1	10.3	34+2	7	13	16	i,12	i,6	34	10	16
	M	?	35.5	26.5	40.0	9.3	33+1	6	12	15	i,11	i,7	33	10	16
	F	?	35.2	25.6	43.5	9.9	33+2	8	12	17	i,12	i,7	34	10	16
	M	?	35.1	25.4	44.4	9.4	33+2	5	11	14	i,11	i,7	34	10	16
	F	?	35.0	24.9	41.4	10.3	34+1	7	12	16	i,12	i,7	34	10	16
	M	?	33.9	26.0	40.1	10.0	32+2	5	11	14	i,13	i,7	34	10	16
	F	?	32.9	26.7	44.7	10.3	32+2	5	11	14	i,11	i,7	33	10	16
	F	?	32.4	24.7	40.7	9.6	34+2	6	11	14	i,12	i,7	34	11	17
	F	?	32.1	26.2	43.0	10.0	34+2	5	11	16	i,11	i,7	35	11	16
	F	?	29.9	28.4	44.1	10.4	32+2	4	11	15	i,12	i,7	33	10	16
AMNH 10795	M	?	48.0	24.8	49.8	8.5	33+2	5	11	14	i,12	i,7	33	9	16
	F	?	30.9	26.5	42.7	10.7	33+2	5	11	14	i,11	i,7	34	11	16
	F	?	28.4	27.5	40.1	10.9	33+2	4	11	14	i,11	i,7	34	10	17
	M	?	28.0	25.7	43.2	10.7	33+2	6	11	15	i,11	i,7	35	10	16
	F	?	27.6	25.4	43.8	11.2	32+2	5	11	14	i,11	i,7	33	10	16
	F	28.9	23.2	28.0	41.8	11.2	32+2	5	11	14	i,10	i,7	33	10	16
NSMT-P 32696	M	?	41.6	25.7	42.8	9.6	34+1	6	11	14	i,11	i,7	34	10	16
	M	46.4	36.9	27.9	41.5	10.8	34+1	7	11	13	i,10	i,7	34	10	17
	M	47.7	37.4	24.6	43.0	10.4	33+2	8	11	14	i,11	i,7	34	10	16
	F	?	32.6	26.7	41.4	10.4	33+2	8	11	15	i,11	i,7	34	10	16
	F	?	32.0	26.3	42.5	10.6	34+1	8	12	16	i,11	i,7	34	10	16

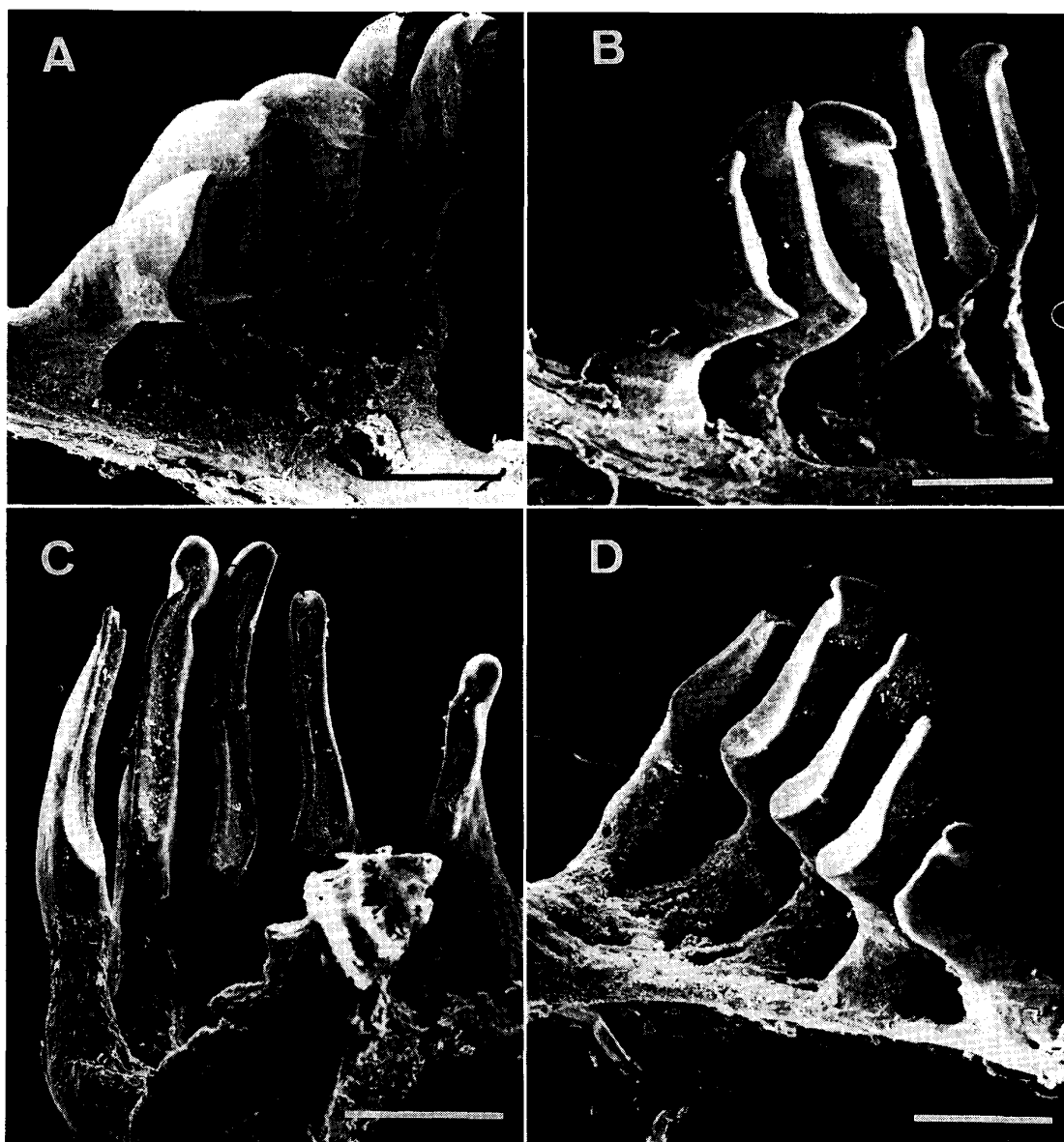* From the original description (Nichols & Pope, 1927).

Fig. 6. Pharyngeal teeth of *Rhodeus spinalis* (including *R. hainanensis* and *R. spinalis*) and *R. haradai* sp. nov. A: *R. spinalis*, AMNH 29680. B: *R. spinalis*, AMNH 29680. C: *R. hainanensis*, AMNH 10769. D: *R. haradai* sp. nov., NTUM 2203. Each scale indicates 500 μm.

rays i, 6–7 (i, 7); caudal fin rays i+9/8+i (i+9/8+i). First simple rays of dorsal and anal fins very small and hidden under scales.

Lateral line incomplete: pored scales 5–11 (11); scales in lateral series 32–34+ 1–2 (33+2). Transverse scale counts: 11 (11) in front of pelvic fin base; 11 (11) to pelvic fin base. Scales around caudal peduncle 14 (14). Predorsal scales 14 to 15 (15), including a deeply notched one in front of first dorsal ray. No barbels.

Vertebrae: abdominal 16 (16); caudal 17–19 (18); total 33–35 (34).

Longest simple rays of dorsal and anal fins strong, but having segments distally,
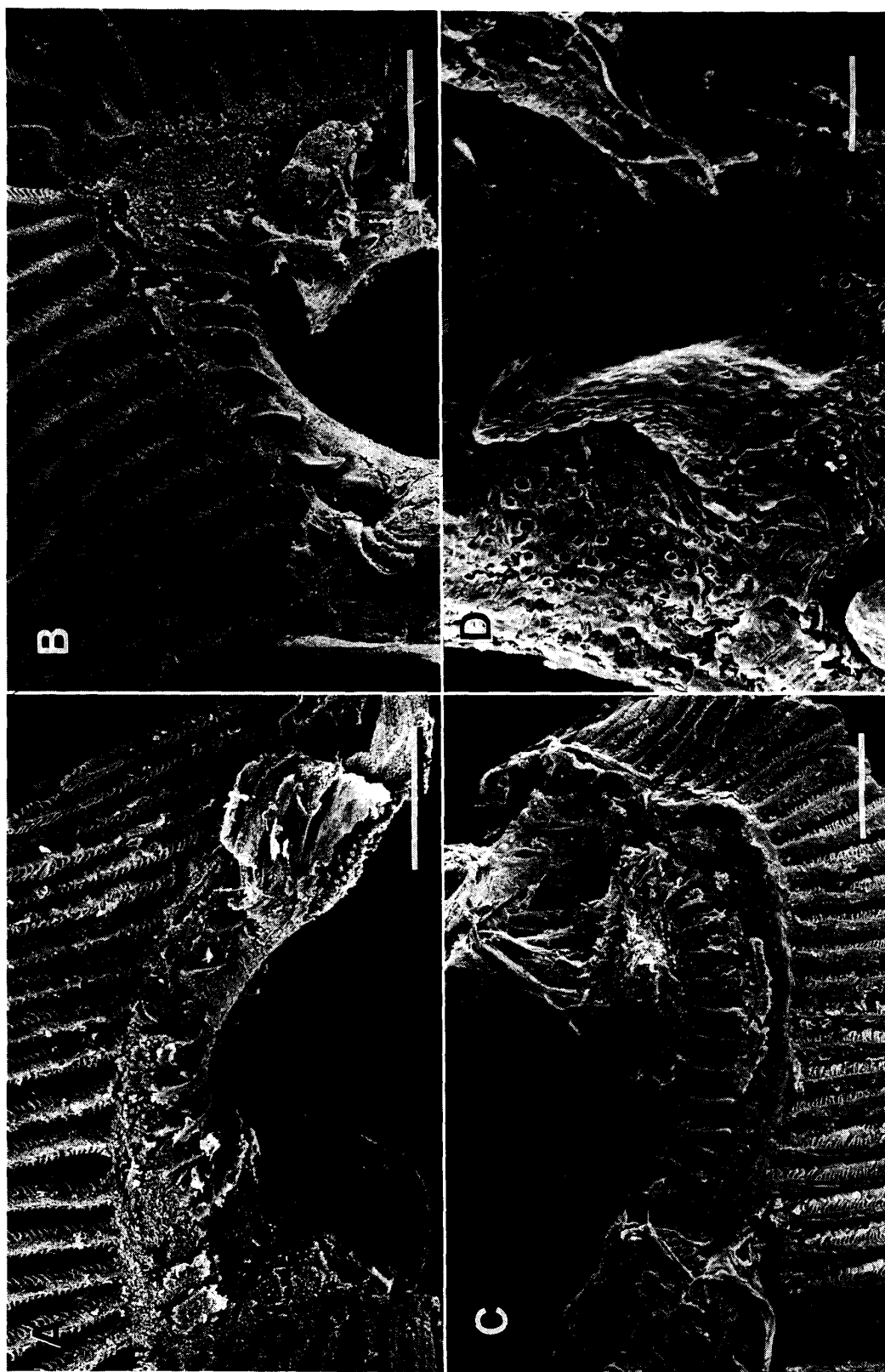
Fig. 7. Gill rakers on outer side of the 1st gill arch of *Rhodeus spinalis* and *R. haradai* sp. nov. A: *R. spinalis*, AMNH 29680 (left gill). B and D: *R. hainanensis*, AMNH 10769 (right gill). C: *R. haradai* sp. nov., NTUM 2203 (left gill). Scales of Figs. A, B and C indicate 500 μm. A scale of Fig. D indicates 50 μm.

i. e., the longest simple ray has segments on the part corresponding to the area between the first and second branching points of the first branched ray (Fig. 5 A–D). D-PTG-1 = 10–11 (10) except two specimens. A-PTG-1 = 16–17 (16) except one specimen.

Pharyngeal teeth.   The dental formula is 0.0.5–5.0.0 and five teeth are arranged in a row on the pharyngeal bone of each side (Fig. 6).   The dentition is polyphyodont and homodont.   The crowns of the teeth have the occlusal grooves and the occlusal surfaces.   The occlusal grooves on the pharyngeal teeth are relatively reduced and the chewing area on the pharyngeal first tooth is relatively developed.   These characteristics of the pharyngeal teeth are shared by *R. spinalis* and *R. hainanensis*, and show a typical type specific to *Rhodeus*.

Gill rakers.   The number of gill rakers on external side of the first gill arch ranges from 8 to 12 (Fig. 7).   The gill rakers are nearly triangular and pyramid-shaped. Each gill raker is a flat plate and relatively underdeveloped.

Coloration of preserved specimens.   The lateral dark line on the body side of the male is broader than that of the female (Fig. 3).

Distribution.   Hainan Island and Xi Jiang of Pearl River System, Longzhou Xian, Guangxi.

Remarks.   Nichols and Pope (1927) reported the serrated pharyngeal teeth of *P. hainanensis*, which they considered as one of key characters of *Pseudoperilampus* Bleeker, 1863, but the serration of the pharyngeal teeth of *P. hainanensis* is underdeveloped and differs from the well-developed serration of the pharyngeal teeth of *P. typus*, the type-species of *Pseudoperilampus* (Suzuki & Hibiya, 1985, fig. 6D).   The characteristics of the pharyngeal teeth of *P. hainanensis* are similar to those of *Rhodeus spinalis* (Fig. 5) and show those of the typical *Rhodeus* type.   Moreover, the genus *Pseudoperilampus* consists of one species, *P. typus*, which is different in the generic level from all other nominal species erroneously placed in *Pseudoperilampus* (Arai & Akai, 1988).   *P. typus* should be classified into *Acheilognathus*, not into *Rhodeus*, and all *Pseudoperilampus* species except *P. typus* should be classified into *Rhodeus*. It is apparent error that Lin (1987) classified *A. typus* (=*P. typus*) into *Rhodeus*.

On the other hand, as regards morphometric and meristic data, and body color, the specimens of *P. hainanensis* do not differ from those of *R. spinalis*.   Therefore, *P. hainanensis* is synonymized with *R. spinalis*.

As regards the specimens of Jin (1986) and Lin (1989), the number of the pelvic fin rays ranges from i, 6 to i, 8.   However, as far as we have examined, almost all specimens have i, 7 in the pelvic fin rays.   Chen and Li (1989, p. 127) reported *R. spinalis* from Hekou, Yuan Jiang, Yunnan.   But *R. spinalis* sensu Chen and Li is not *R. spinalis* by the following reasons, (1) the value of the number of branched anal rays minus that of branched dorsal rays is smaller than 3, and (2) the number of the pelvic fin rays is small, i, 5.

Rhodeus spinalis was reported as the only *Rhodeus* in Taiwan (Tzeng, 1986). We examined the specimens identified as *R. spinalis* by Tzeng and found them to be *R. ocellatus*. Oshima (1919, p. 233) reported a *Rhodeus* for the first time from Taiwan
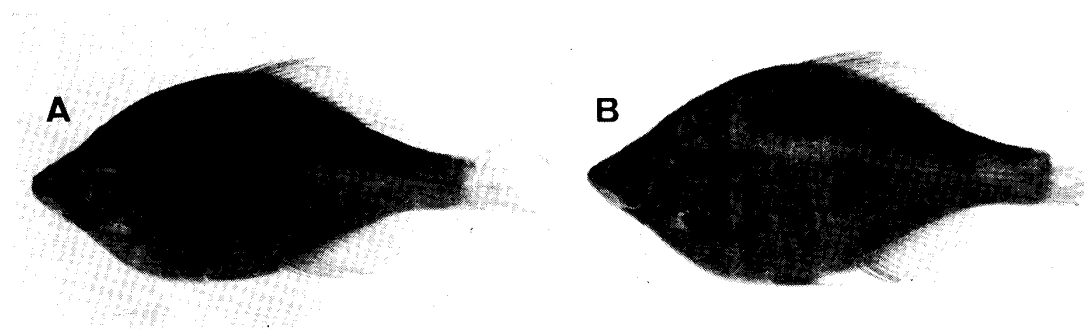
Fig. 8.   *Rhodeus haradai* sp. nov.   A: Holotype, NTUM 7600, male, 56.0 mm SL, from Long-tang, Hainan Island. B: Paratype, NSMT-P 30931, female, 51.4 mm SL, from Longtang, Hainan Island.

and identified it as *R. ocellatus*. Specimens of *R. spinalis* used for the hybridization experiments in rhodeine fishes (DUYVENÉ DE WIT, 1961) are from Taiwan and not *R. spinalis* but *R. ocellatus*. This is confirmed from figs. 7 and 9 in DUYVENÉ DE WIT (1961).

Rhodeus haradai sp. nov.

[Japanese name: Kagami-bara-tanago]

(Fig. 8)

Rhodeus spinalis: HARADA, 1943, p. 61, fig. 71.

Holotype.   NTUM 7600, male, 56.0 mm in SL, Longtang, Hainan Island, June, 1942.

Paratypes.   NTUM 2203, 10 individuals, 45.9–59.9 mm in SL, collected at the same locality and date as the holotype; NSMT-P 30930, male, 55.0 mm in SL and NSMT-P 30931, female, 51.4 mm in SL, collected at the same locality and date as the holotype.

Diagnosis.   This species is distinguished from the other *Rhodeus* species by a narrow longitudinal line on the body side in the male, and the body with protruding muscular breast region. The value of the number of branched anal rays minus that of branched dorsal rays ranges 0 to 2, 1 in mode. Longest simple rays of the dorsal and anal fins are the most strong and spiny in the *Rhodeus*.

Description.   Morphometric and meristic data (Table 3). Data of the holotype are shown in parentheses. Total length 120.9–129.1 (128.0) %SL; head length 21.0–23.8 (22.1) %SL; body depth 47.7–55.6 (50.0) %SL; predorsal length 54.7–58.4 (57.0) %SL; length of caudal peduncle 13.1–16.6 (16.1) %SL; depth of caudal peduncle 12.9–15.5 (14.3) %SL; orbit diameter 7.9–9.2 (8.4) %SL; snout length 5.4–6.8 (6.8) %SL.

Dosal fin rays iii, 12–13 (iii, 12); anal fin rays iii, 12–14 (iii, 14); branched anal rays minus branched dorsal rays, 0–2 (2); pectoral fin rays i, 11–12 (i, 12); pelvic fin rays i, 7 (i, 7); caudal fin rays i+9/8+i (i+9/8+i). First simple rays of dorsal and

Table 3. Meristic counts and morphometric measurements of *Rhodeus haradai* sp. nov.

Specimens	Sex	TL (mm)	SL (mm)	HL (%SL)	BD (%SL)	OD (%SL)	Scales		Branched rays				VN	D-PTG	A-PTG
							LS	PS	D	A	P_1	P_2			
Holotype														1	1
NTUM 7600	M	71.7	56.0	22.1	50.0	8.4	33	8	12	14	i, 12	i, 7	34	9	16
Paratypes															
NSMT-P 30930	M	71.0	55.0	23.8	52.4	8.5	33	5	13	14	i, 12	i, 7	34	9	16
NSMT-P 30931	F	?	51.4	21.8	51.9	8.8	?	?	12	14	i, 11	i, 7	34	9	16
NTUM 2203	M	72.4	59.9	22.0	48.7	8.0	?	?	12	13	i, 11	i, 7	33	9	16
	M	71.7	57.8	21.3	52.1	8.5	33	5	12	14	i, 11	i, 7	33	9	16
	F	70.0	56.1	21.0	51.3	8.6	33	6	12	13	i, 11	i, 7	33	9	15
	M	70.3	54.6	22.3	49.1	7.9	33	6	13	14	i, 12	i, 7	34	10	16
	M	69.3	53.9	22.8	51.8	8.5	34	6	12	13	i, 12	i, 7	33	9	16
	M*	68.8	53.6	23.7	55.6	9.0	34	7	12	13	i, 11	i, 7	?	?	?
	F	?	52.4	22.9	47.7	9.2	33	7	12	13	i, 11	i, 7	33	9	16
	F	62.3	48.5	22.5	48.5	8.9	33	6	12	12	i, 11	i, 7	33	9	16
	F	?	47.8	22.6	51.9	9.2	34	5	12	13	i, 11	i, 7	34	9	16
	F	?	45.9	22.4	49.5	9.2	33	6	13	13	i, 11	i, 7	33	9	15

* Abnormal.

anal fins very small and hidden under scales (Fig. 4).

Lateral line incomplete: pored scales 5–8 (8); scales in lateral series 33–34 (33). The presence or absence of scales on the caudal fin is unknown for the bad condition of preserved specimens. Transverse scale counts: 11 (11) in front of pelvic fin base; 11 (11) to pelvic fin base. Scales around caudal peduncle 14 (14).

Predorsal scales 13–14 (13), including a deeply notched one immediately in front of first dorsal ray. No barbels.

Vertebrae: abdominal 15–16 (16); caudal 17–18 (18); total 33–34 (34).

Pterygiophore of first dorsal ray inserted between 9th and 10th neural spines (D-PTG-1=9 (9) except one specimen), pterygiophore of first anal fin ray inserted before first haemal spine (A-PTG-1=15 to 16 (16)).

Longest simple rays of anal fins strong and spiny, with segments on the tip. Those of dorsal fins of all specimens examined are incomplete, and it is unknown whether they have segments on the tip (Fig. 5 E and F).

Pharyngeal teeth. 0.0.5–5.0.0. Characteristics of the pharyngeal teeth are similar to those of *Rhodeus spinalis* (Fig. 6).

Gill rakers. The gill rakers on the external side of the first gill arch range from 14 to 15 (Fig. 7). The gill rakers are nearly triangular and pyramid-shaped. Each gill raker is a flat plate and relatively underdeveloped.

Coloration of preserved specimens. The lateral dark line on the body side is narrow in both males and females, and narrower than that in the male of any other *Rhodeus* species.

Distribution. Hainan Island.

Etymology. The specific name, *haradai* refers to the name of the ichthyologist who reported this new species as *Rhodeus spinalis* OSHIMA.

Remarks. *Rhodeus haradai* sp. nov. is similar to *Rhodeus spinalis*, but differs from *R. spinalis* in the following points, (1) body form is more rhomboidal, (2) the number of branched anal rays minus that of branched dorsal rays is smaller than 3, (3) longitudinal band on the body side of the male is narrower, (4) D-PTG-1 is inserted more anteriorly than that of *R. spinalis*, and (5) longest simple rays of dorsal and anal fins are more strong and spiny, i. e., each of them has not segments on the part corresponding to the area between the first and second branching points of the first branched ray (Fig. 5).

JIN (1986) reported *R. spinalis* from Hainan. Specimens of *R. spinalis* sensu JIN (1986) may consist of *R. spinalis* and *R. haradai* sp. nov. But we can not separate two species from JIN's description.

Japanese name of *R. haradai* sp. nov. had already been given by HARADA (1943).

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